MicroLog & MicroLog Plus

User Guide

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Using the Guide

MicroLog is a compact data logger used to monitor the temperature and humidity of perishable goods. It can also be connected to external sensors in order to monitor additional parameters, and can be mounted onto a cradle for use with the Sound Alarm feature as well as the wireless Daily Download tool.

MicroLog Plus is a sophisticated data logging system, which can remotely monitor up to 200 MicroLogs simultaneously.
Chapter 1 of this guide details the operation procedures for MicroLog as a stand-alone device, as well as how to work with its software program, MicroLab.
If you are using the wireless MicroLog Plus system read Chapter 2, which details the setup and operation of the wireless MicroLog

Plus system, while Chapter 3 deals with using MicroLog together with a cradle. Chapter 4 covers connecting your MicroLog to a receiver, Chapter 5 explains the use of external antenna, and Chapter 6 deals with connecting it to external sensors.

Chapter 1 MicroLog

1.1. Overview

MicroLog can be used as a stand-alone device to monitor temperature and humidity levels. All viewing, exporting and printing of the data obtained is done with just two keys. MicroLog continuously displays the most recent recordings, along with the maximum and minimum values for a selected time interval. Users can also define minimum and maximum alarm levels for a specific shipment, and the display screen will begin to flash if either level is breached.

(Instructions for using the Sound Alarm feature can be found in section 3.1.1)

The data stored by MicroLog can be downloaded to any computer for further viewing and analysis using the MicroLab software, and can be exported to a spreadsheet.

1.2. Getting Started

In order to save battery life, MicroLog is shipped in Stop Mode. This means that before you can start recording, you must first connect MicroLog to the PC and set it up with the accompanying software. To set up MicroLog with the MicroLab software, refer to section 1.4.

Once MicroLog receives the setup command, it begins logging the data immediately.

1.3. Working with MicroLog

1.3.1. Data Displays

1. Current data

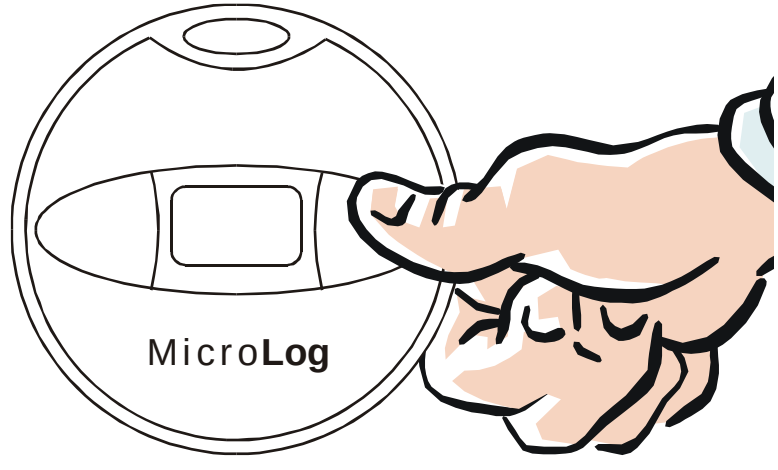
When MicroLog is recording, the data from the sensors is displayed alternately. The data obtained from external sensors is displayed with a small EXT symbol.
When MicroLog stores the data, the LCD display briefly changes to a "double dash" (- -) symbol.

2. Minimum and maximum values

You can display minimum and maximum values for any hour from the last 24 hours and for any day from the last 30 days by using MicroLog's left and right keys:

Viewing Min. and Max Values in the Last 1-24 Hours

1. Select a time period by pressing the **right** key on the MicroLog. The LCD will begin displaying the hour number, ranging from hours 1 to 24. Once you've reached the desired time period, release the right key.

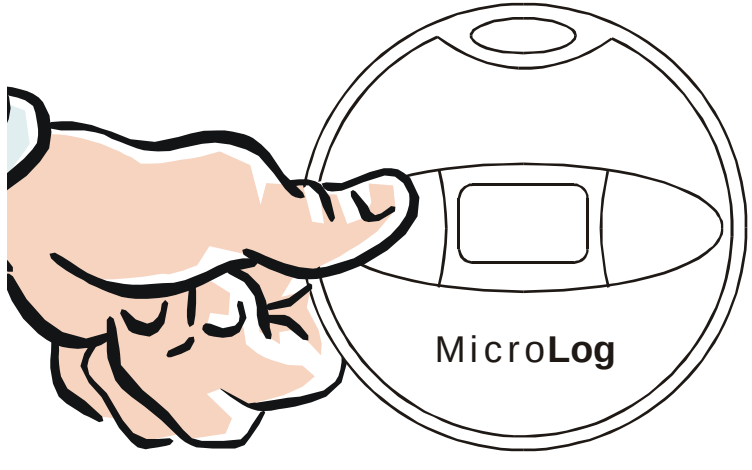


2. Once you've released the right key, MicroLog will display the Min and Max values logged by the sensors during the selected time period.
3. (Optional) Once the left key is released, MicroLog will send an IR signal of the Min and Max values for the selected time period.

To receive a printout of this data, simply point the MicroLog to the IR printer (HP portable printer – model No. 82240B).

Viewing Min. and Max Values for the last 1-30 Days

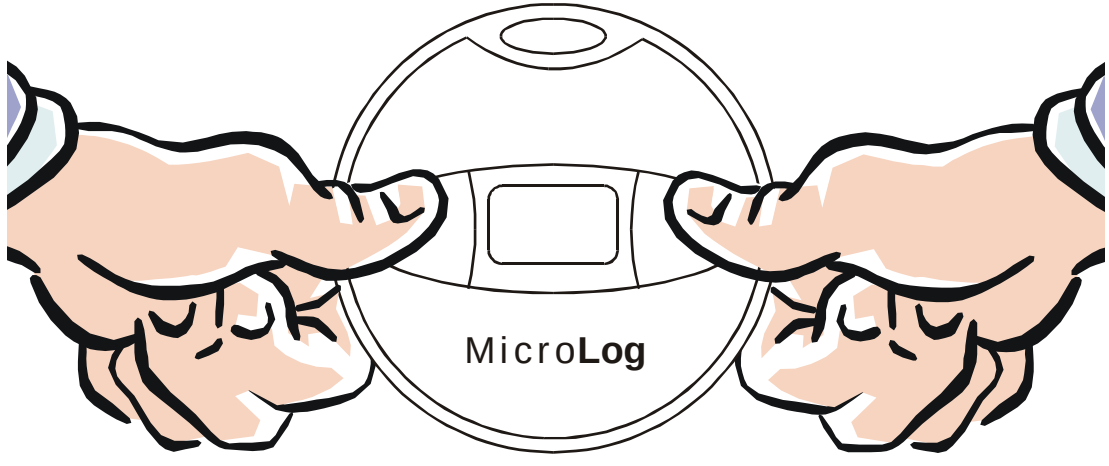
1. Select a time period by pressing the **left** key on the MicroLog. The LCD will display the day number, ranging from days 1 to 30. Once you've reached the desired time period, release the left key.



2. Once the left key is released, MicroLog will display the Min and Max values of the sensors for the selected time period.
3. (Optional) Once the left key is released, the MicroLog will send an IR signal of the Min and Max values for the selected time period. To receive a printout of this data, simply point MicroLog to the IR printer (HP portable printer – model No. 82240B).

3. Status messages

When both the left and right keys are pressed simultaneously, the MicroLog LCD will display MicroLog's status. This will also "wake up" the device, a step necessary for its communication with a computer. The status messages include:



– Run

– Cyclic Run

– Timer Run

– Stop Mode

– Downloading data to a PC

1.3.2. Working Modes

MicroLog is always set in one of the 4 possible modes:
Stop – MicroLog is idle and is not recording.

Run – MicroLog is recording data. It will stop recording automatically when its memory is full (16,000 recordings).
Cyclic Run – Same as Run, but MicroLog will record over the old data when the memory is full, beginning with the earliest data recording.
Timer Run – MicroLog can be configured to start recording at a predetermined time. When MicroLog is set for such a run, its status is set to Timer Run. Once MicroLog starts recording, its status changes to either Run or Cyclic Run, depending on the desired configuration.

1.3.3. MicroLog's Connections

Note: MicroLog ships with a rubber plug that covers the rear socket. The plug protects the socket from moisture. Unless you are using the socket leave the plug in.

1. Connect MicroLog to a computer

For this you will need a serial communication cable (catalog number DT058).

The serial communication cable ends with a type D 9-pin female plug. Plug this in to any free COM port on your computer.

The other end of the serial communication cable ends with a small black flat plug. Plug this end into the socket at the back of the MicroLog.
Note that the socket has three pins, with one further away from the other two (Figure 1). Take care to plug the cable in correctly.

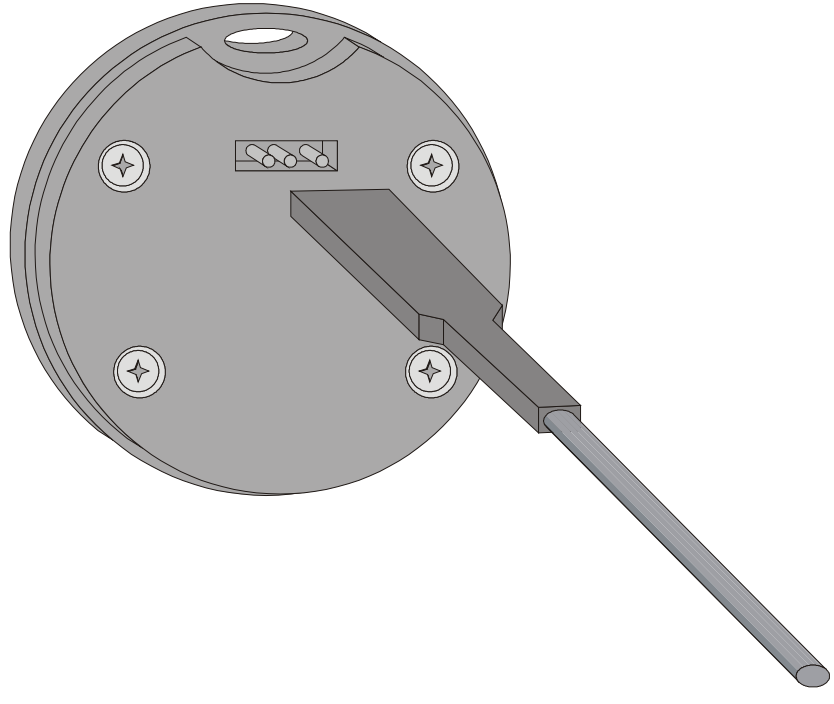


Figure 1: Connecting MicroLog

Note: You can also connect to the PC via the Cradle (see page 159).

2. Connect MicroLog to an external sensor

Use the same PC connection socket to connect to an external sensor (see Figure 1).
Note that the socket has three pins, with one further away from the other two (Figure 1). Take care to plug the cable in correctly.

Note: You can also connect the external sensor to the Cradle (see page 159).

1.3.4. Sleep Mode

The MicroLog battery's maximum lifespan is approximately 1.5 years. This long battery life is achieved by MicroLog putting itself "to sleep" between recordings, or after 4 minutes goes by without communication with the computer. While sleeping the data logger consumes a minimal amount of power.

MicroLog "wakes up" every second for a very short time (a few micro-seconds) to check if one of the keys has been pressed or if there is a message coming in from the computer. This is the reason you have to press and hold a key for at least two seconds before a status message appears.

If you use high sampling rates, the MicroLog battery’s lifespan will be considerably shorter (see Figure 2).

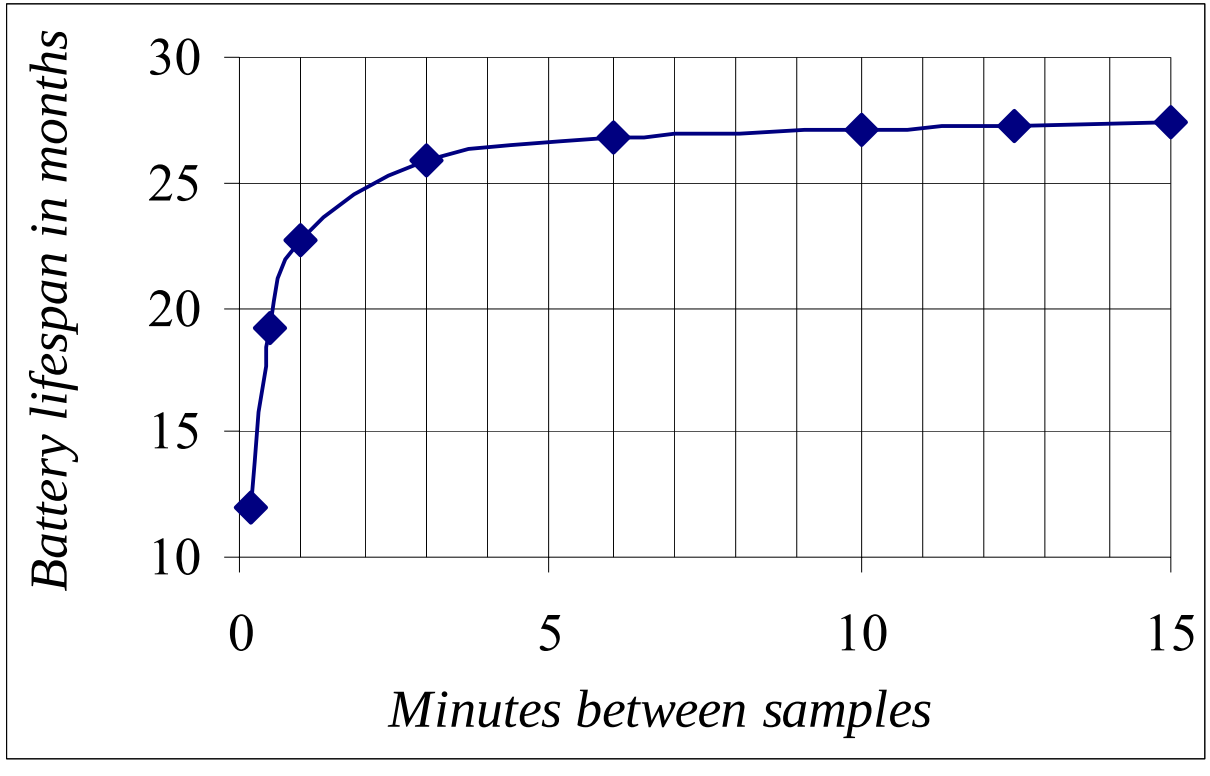


Figure 2: MicroLog battery life

1.3.5. Replacing the Battery

Warning: The back cover of the MicroLog contains a special compartment for the humidity sensor, which is very fragile. When removing or replacing the cover, be careful not to harm the sensor

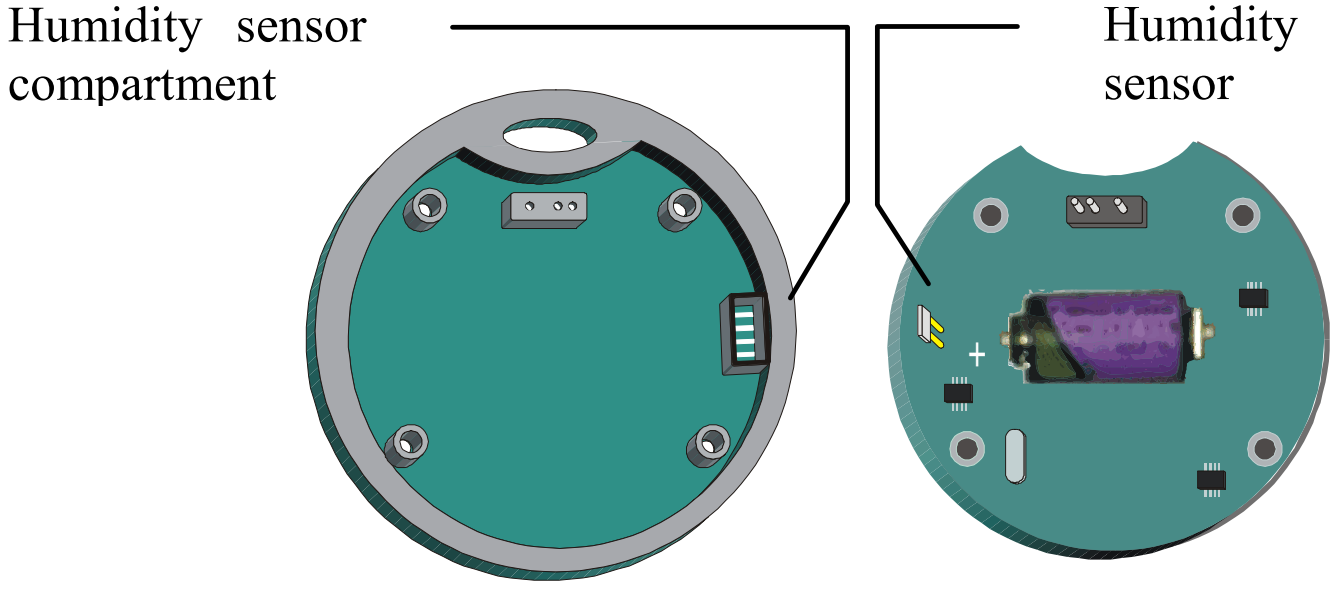
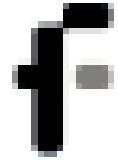


Figure 3: Replacing the battery

MicroLog's battery is a 1/2AA 3.6V lithium battery

1. Unfasten the four screws on the back of the MicroLog.
2. Carefully remove the back cover
3. Replace the battery, and be sure to insert the new battery into the correct corresponding polarities (look for the **"+"** symbol next to the positive terminal)
4. Carefully reposition the electronic board on MicroLog's back cover and make sure that the humidity sensor is placed in its compartment.
5. Refasten the four screws on the back of the MicroLog.



1.4. Working with the MicroLab Software

1.4.1. Install the Software

Insert the CD into your CD drive.
The installation will start automatically. Once the process begins, follow the on-screen instructions.
In case auto run is not working, open the CD drive folder and double-click the setup icon, then follow the on-screen instructions.
To uninstall the software: From the Start menu select Settings / Control Panel, and use the Add/Remove programs function to remove the MicroLab application.

1.4.2. Overview

The **MicroLab** software was designed to allow for the programming of the desired data recording specifications for MicroLog, to enable the downloading of recorded data to a PC, and to store, view and analyze the data.

The **Logger** menu handles all communication between the PC and MicroLog such as programming the desired recording mode, starting or stopping data recording, as well as downloading the data.

The **View** menu controls the various data display options. Data can be viewed in graph format, in table format, or in both. The **Data Map** is a separate pane that displays a list of the open data sets. It can also be used to quickly navigate through the data sets.

The **Graph** menu contains all the commands needed to format and edit the graph.

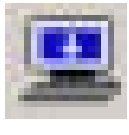
The most common tasks and commands are available as buttons on the **main toolbar** and on the **graph toolbar**.

1.4.3. Getting Started

1. Download data

a. Connect MicroLog to the PC

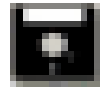
b. Open the MicroLab software

c. Click **Download**  on the main toolbar.

Once the downloading has been completed, the data will be displayed both in the graph and in the table, and a new data icon will be added to the Data Map.

You can now connect a different MicroLog to the PC and download its data. The number of downloads is limited only by the memory available on the computer.
Use the Data Map (section 1.4.4.4) to navigate between the different data sets.

2. Save data

To save the displayed data, click **Save**  on the main toolbar. The data currently displayed by the graph will be saved in the MicroLog Data folder:

C:\Program Files\Fourier Systems\MicroLog\MicroLog Data

The data file name consists of the MicroLog name (Comment, see page 57) and of the time and date at which it was saved.

To save data in a different location or under a different name, use the **Save as…** command from the File menu:

d. Select **Save as…** from the **File** menu.

e. Enter a new name in the **File name** box

f. To save the data in a different folder, select a drive and/or folder from the **Save in** box

g. Click **Save**

If you've downloaded data from more than one MicroLog and you want to save all the data sets, select **Save all** from the **File** menu.

If you are using the Daily download option, data will be saved automatically.

Note: If you want to remove unwanted data before saving, apply the crop tool (see page 52).

3. Open files

a. Click **Open** on the main toolbar.

b. To open a document that was saved in a different folder, select a drive and/or folder in the **Look in** box.

c. Double-click the file you want to open.

4. Display properties

You can change the way numbers and dates will be displayed on screen.

a. Click File on the menu bar, then click Display properties.

b. In the Decimal place settings, enter the number of decimal places you want to display (Enter a number between 0 and 4) for each sensor.

c. In the Date format settings select the desired format option.

d. Click OK.

5. Print a graph

a. Click **Print** on the main toolbar to open the Print

Options dialog box.

b. Click the **graph** option.

c. Click **Print** to open the Print Dialog Box.

d. Click OK.

6. Print a table

The displayed data can also be printed as a table. The table will only include data from sensors that are currently represented on the graph (to learn how to add or remove data sets from the graph, see page 45) as well as the MicroLog name, serial number and the alarm level setup. Data that exceeds any of the alarm levels will be highlighted by arrows.

a. Click **Print** on the main toolbar to open the Print Options dialog box.

b. Click the **Table** option.

c. If you want to print only part of the data, uncheck the check box and select the desired time and date in the **From** and **To** boxes.

d. Click the **Print** button to open the Print dialog box.

e. Click **OK**.

1.4.4. View the Data

1. Display options

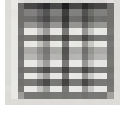
MicroLab's screen consists of three parts: the graph, the table and the Data Map. You can display all three parts simultaneously (the default view) or any combination of them.
If you are using the daily download option you can display a daily status window.

2. Graph

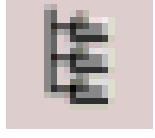
Click **Graph** to display or remove the graph. The graph displays the data sets plotted vs. time. The graph usually displays all the data sets of a given MicroLog, but you can use the Data

Map to remove one or more of the sets from the graph (see section 4 in this chapter).
In order to keep the graph clear and simple, only two Y-axes can be shown on the graph simultaneously. If there are three curves in the graph, one of the Y-axes will be hidden. To make this axis visible, select the corresponding plot with the cursor (see page 47). You can identify the Y-axis by its color, which matches the plot color.

3. Table

Click **Table**  to display or remove the table.
The data in the table always matches the data that is currently displayed on the graph.

4. Data Map

Click **Data Map**  to display or remove the Data Map.

The Data Map is a separate window that displays the list of data sets that were downloaded or opened in the current session. Use the Data Map to navigate through the available plots and to keep track of the data that is being displayed in the graph and/or table windows.

When you double-click on a MicroLog icon in the Document Map, MicroLab jumps to the corresponding data and displays it in the graph and table windows. It also expands the Data Map to show the individual sensors included with the selected MicroLog.

A graph icon indicates that the data set is currently being displayed. Double click on the icon to clear the data set from the display.

An empty icon indicates that the data set is not being displayed. Double click on the icon to add the data set to the display.

To collapse the sensor list under an individual MicroLog, click the minus sign (-) next to the MicroLog icon.

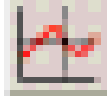
To display the complete sensor list under an individual MicroLog, click the plus sign (+) next to the MicroLog icon.

To remove an individual MicroLog from the Data Map, right-click on its icon, then click **Remove Data**.

To remove all data sets from the Data Map, right-click the Data sets icon , then click **Remove All Data**.

5. The Cursor

Use the cursor to view individual data recording values, or to reveal a hidden Y-axis.

To display the cursor, double click on an individual data point or click **Cursor**  on the graph toolbar. You can drag the cursor with the mouse to any other point on the plot, or to another plot altogether.

The point coordinates of the selected data recording will appear in the status bar at the bottom of the graph window.

6. Zooming and Panning

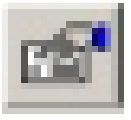
a. Zooming

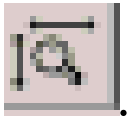
Click **Zoom in** on the graph toolbar and drag the cursor diagonally to select the area you want to magnify. Release the mouse button to zoom in to the selected area.
Click on the **Zoom in** button a second time to turn off the Zoom tool.

b. Autoscale

Click **Autoscale** button on the graph toolbar for the full data display.
Double-click on an individual axis to auto scale it separately.

c. Manual scaling

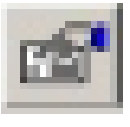
- Click **Graph properties**  on the graph toolbar to open the Graph Properties dialog box.
- Select the **Scale** tab, and choose the axis you want to scale in the **select axis** drop list.
- Uncheck the Autoscale check box and enter the new values in the edit box
- In the time axis, you can either enter the time and date manually, or select it with the up and down arrow buttons.
- Click **OK**.

To restore auto scaling, click **Autoscale**  .

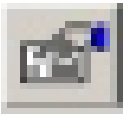
d. Default zooming

If you usually need to view a specific time frame (i.e. workday hours) use the Default zooming tool. You can set the start and end time of the time span and then use it whenever you open a file or download data from the MicroLog.

To set the default zoom:

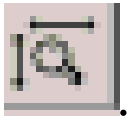
- Click **Graph Properties**  on the graph toolbar, then click **Set Default Zoom**.
- Enter the start and end times, then click **Set**.

To zoom to the default zoom:

- Click **Graph Properties**  on the graph toolbar.

- Check the **Use default zoom** check box and click **OK**.

Every file and every data recording you download will automatically open in the default zoom as long as the **Use default zoom** check box remains checked.

To restore auto scaling click **Autoscale**  .

e. The stretch/compress axis tool

Move the cursor onto one of graph axes. The cursor icon changes to double arrow symbol (↔), indicating that you can stretch or compress the axis scale. Drag the symbol to the desired location. Repeat the procedure for the other axis if necessary.

f. Panning

Use the pan tool after zooming view any part of the graph that is outside the zoomed area.

To do this, click **Pan** on the graph toolbar, then click anywhere on the graph and drag the graph to view another area.
Click **Pan** a second time to turn off the Pan tool.

7. Crop the data

Cropping enables you to trim the edges of a data set. Use it to remove unwanted data

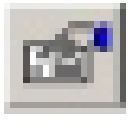
- Zoom to the data range you want to keep.
- Click **Graph** on the menu bar, then click **Crop**.

All data outside the zoomed area will be **permanently** removed.

8. Format the graph

You can change a data line's color, style or width. You can also add markers that represent the data points on the graph and format their style and color.

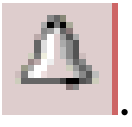
The Y-axis color matches the corresponding plot's color and will change accordingly. The time axis color can be changed separately:

- Click **Graph properties**  on the graph toolbar to open the Graph Properties dialog box.
- Select the **Lines** tab, then select the plot or axis you want to format in the **select plot** drop list.
- From here you can format the line's color, style and width, as well as the markers' color and

style. To remove the line or the marker, uncheck the corresponding **visible** check box.

- To restore the default formatting, click the **Restore default** button, and click **OK**

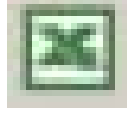
9. Display alarm levels

- Click **Display alarm level**  .
- Select the sensor you wish to display from the **select sensor** drop list

10. Change the temperature units

Click **Toggle °C/°F** button to change the temperature scale from Fahrenheit to Celsius and vice versa.
Note: To change the units in the MicroLog display, use the Setup dialog box (see page 56).

11. Export data to Excel

Click **Export to Excel**  to export the currently displayed data to an Excel spreadsheet. MicroLab will open a new Excel workbook displaying the data along with the MicroLog info, including the MicroLog name, serial number and alarm levels setup.

12. Copy the graph as a picture

You can copy the graph to the clipboard as a picture and then paste it to other Windows programs such as Word and PowerPoint:

1. On the **Graph** menu, click **Copy graph**.
2. Open the destination file.
3. In the destination file, right click and select **paste**.

1.4.5. Program MicroLog

1. Setup

Use the Setup dialog box to view or to change the MicroLog and the Cradle settings

If you intend to setup more then one MicroLog or Cradle use the Save setup tool (see page 66).

- Connect MicroLog or the Cradle to the PC
- Click **Setup** to open the Setup dialog box.

The dialog box is made up of five sections:

a. MicroLog info

Comment

Click the **edit** box and type a name that will serve to identify the specific MicroLog (e.g. its location).

S/N

Displays the MicroLog's serial number

Battery Level

If the indicator is in the red zone the battery should be replaced (see page 32).

b. Cradle info

Cradle ID

The cradle's identification number sets the cradle's transmission time in daily download mode.

Battery Level

If the indicator is in the red zone the battery should be replaced (see page 162).

c. Setup

Temperature

Click the **Temperature** check box to activate the internal temperature sensor

Humidity

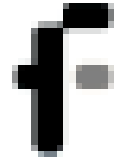
Click the **Humidity** check box to activate the internal humidity sensor

External

Click on the **External** check box to activate the external sensor option, and then select a sensor in the drop list.

If you want to use a sensor that is not found in the drop list, you can define new sensor (see page 74).

The sensors' current readings will appear in the labels next to the sensor name once MicroLog begins logging for the first time.



Temperature unit

To set the temperature unit in the MicroLog display, select the option you want (Celsius or Fahrenheit).

Interval

Determines the logging interval, or the time interval between successive data recordings.

The time format is hh:mm:ss. Set the time setting to select a recording time interval from between 10 seconds and 2 hours. For example, to set a time interval of one hour, five minutes and thirty seconds, click the hours (hh) and type 1 or use the arrows to select 01, then click the minutes (mm) and type 5 or use the arrows, and finally, click the seconds (ss) and type 30 or select 30 using the arrows.

Timer run

Click the **Timer run** check box if you want MicroLog to start recording at a predetermined time. This option is convenient if you are using several MicroLogs at once and want them to all begin logging at the same time.
Use the time and date selectors to set the start time.

Cyclic run

In **Cyclic run** mode, MicroLog overwrites the old measurements (starting with the oldest one) once the MicroLog's memory is full. Click the **Cyclic run** check box to operate in this mode.
If the check box is clear, MicroLog will operate in **Normal run** mode and will stop recording when the memory is full.

Daily download

Check the **Daily download** checkbox to enable automatic daily download (see page 78 for details).

d. Alarm levels

Type in the desired minimum and maximum alarm levels. If MicroLog records a reading that exceeds either of these levels, the MicroLog's LCD will start to flash and the cradle's alarm will sound.
To stop the LCD's flashing, press either of its two keys. To stop the cradle's alarm, press both the MicroLog's keys simultaneously.

The default alarm levels are the lower and upper ends of the sensors. Click **Cancel Alarm** to restore the default levels.

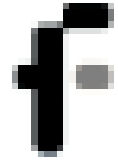
e. Cradle time settings

Workday hours

Use the up and down arrow buttons to set the daily period when you want the Alarm and/or the Daily Download to be active, or type the desired period in manually.

Alarm delay

Click the drop list to select the time delay between the time MicroLog records a reading that exceeds the alarm levels and the time the alarm will sound.



Alarm duration

Click the drop list to select the time for which the alarm will sound before it stops automatically.

Complete the setup

Click **Send setup** to send the new settings to MicroLog, which will complete the setup. Click **Cancel** if you don't want to change the setup.

Note: The **Send setup** command erases all existing data in the MicroLog.

If you set it to **Timer run** mode, MicroLog will wait in standby mode displaying , and will begin recording at the specified time.

2. Saving Setup

When setting up multiple MicroLogs or Cradles use the **Save Setup** option in the **Setup** dialog.

1. After you have finished the settings selection of the first MicroLog or Cradle and before sending the setup command, click **Save Setup** to save all the setup settings.
2. Connect another MicroLog or Cradle to the PC, click **Setup**

on the main toolbar, then click **Load Setup** to load your setup settings.
3. Change the Cradle ID.
4. Change the comment (optional).
5. Click **Send Setup**.

3. Start recording

Click **Run** every time you want to start a new recording. The **Run** command erases all previous data in the MicroLog's memory and begins recording.

Note: If you setup the MicroLog using the Setup command, it will automatically begin recording, and you don't have to click **Run**

4. Stop recording

Click **Stop** to stop recording. In Stop mode, MicroLog keeps all recorded data but does not record new data. Use this mode to save battery power.

5. Sensor calibration

A new MicroLog comes fully calibrated. After a period of long use, however, you may want to recalibrate the humidity or the temperature sensors.
The humidity calibration affects both MicroLog and MicroLab and should be carried out while MicroLog is connected to the PC. The temperature calibration affects only the MicroLab software and can be carried out regardless of whether MicroLog is connected to the PC.

Calibration password

To prevent accidental change of the calibration, the calibration procedure is protected by a password. The default password is: 1234. To change the password:

a. Click **Logger** on the menu toolbar, then click **Calibration**.

b. Click **Change Password** to open the Change Password dialog box.

c. Enter the current password in the **Current Password** edit box.

d. Enter the new password in the **New Password** edit box.

e. Enter the new password a second time in the **Confirm New Password** edit box to confirm your new password.

f. Click **OK**.

Note: The password must include at least 4 characters and is **case sensitive.**

Humidity calibration

To calibrate the humidity sensor you will need a humidity chamber.

a. Connect MicroLog to the PC

b. Set up MicroLog to record every 10 seconds (see page 56).

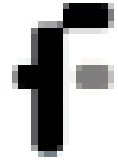
c. Click **Logger** on the menu bar, then click **Calibration.**

d. Enter the calibration password, then click **OK**.

e. Select **Humidity** in the **Choose sensor** drop list

f. Click **Default** to restore the original values

g. Disconnect MicroLog from the PC and insert it into the



humidity chamber.

h. Set the humidity chamber to the first reference value. Wait until the humidity level is stabilized and write down MicroLog's reading.

i. Repeat the last step with the second reference value.

j. Connect MicroLog to the PC.

k. Enter the two reference values into the **MicroLog value** edit boxes.

l. Enter the two MicroLog values into the **Reference value** edit boxes.

m. Click **Calibrate**.

To restore default calibration, click **Default**.

Temperature calibration

a. Click **Logger** on the menu bar, then click **Calibration.**

b. Enter the calibration password, then click **OK**.

c. Select **Temperature** or **Ext. Temperature** in the **Choose sensor** drop list.

d. Click the **Default** button to restore the original values.

e. Enter the two reference values into the **MicroLog value** edit boxes.

f. Enter the two MicroLog values into the **Reference value** edit boxes.

g. Click **Calibrate**.

To restore default calibration, click **Default**.

6. Defining a custom sensor

You can use MicroLog with any sensor that has a 0 – 20mA current output or a 0 – 10V voltage output.

a. Click the **Logger** menu and then select **Define new sensors** to open the Define New Sensor dialog box.

b. Click **Add** to add a new sensor to the list.

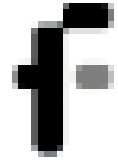
c. In the Based on drop list, select an external sensor that matches your sensor's output

d. Type the sensor's name in the **Sensor Name** edit box.

e. Type the sensor's unit in the **Sensor Unit** edit box.

f. In the Calibration Values section, enter two values of your sensor that correspond to the base sensor values. For example, see the definition for a 0 – 100mbar pressure sensor whose output is 0 – 20mA:

Figure 4: Define New Sensor



g. Click **OK**.

The new sensor will then appear in the External Sensor list in the Setup dialog box.

7. Communication setup

Communication between the PC and a MicroLog takes place automatically whenever you send a command to MicroLog. However, the Communication Setup dialog box can be used for more advanced communication options.

Click on the **Logger** menu and then select **Com setup** to open the Communication Setup dialog box:

If you are not using a receiver and cradle, uncheck the **Search for Receiver and Cradle** checkbox in order to speed up the search.

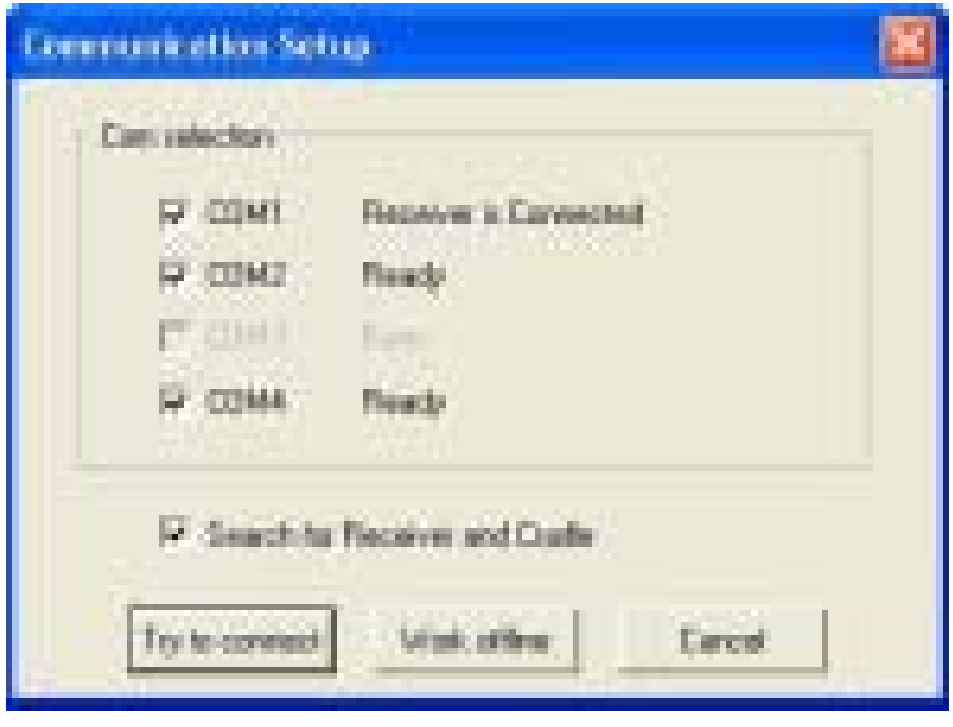


Figure 5: MicroLab's Communication Setup dialog box

The checked COM ports are available for communication.
Click **Try to connect** to establish communication.
Click **Work offline** to work with saved files.

1.4.6. Automatic Daily Download

You can program all the MicroLogs on your line to automatically transmit their data to a PC every day, at a preset time.
To work with this option you will need to mount the MicroLogs onto wireless Cradles (see page 157) and connect a receiver to the PC (see page 169).

1. Prepare the MicroLog.

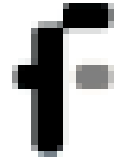
To prepare a Cradle with MicroLog system for daily download:

a. Connect the cradle to the PC (see page 159).

b. Setup the MicroLog and the cradle (see page 56).

Notes:

1. Enter an identification number for the cradle in the **Unit ID** edit box. The number should be an integer between 1 and 200 and every cradle should have a different ID number. (We recommend attaching a label with the ID number to every cradle.)
2. While in daily download mode the cradle transmits only data that was recorded during workday hours. It is therefore important to accurately set the workday hours when setting up the cradle's time settings. To download all data from a specific cradle use the manual transmission option (see page 83).
3. The recording interval **must** be equal to or greater than 1 minute for recording data from one sensor, 2 minutes for 2 sensors and 3 minutes for 3 sensors.



c. Check the **Daily download** checkbox.

d. To set the download time and file location click **Daily download** at the bottom of the setup dialog to open the Daily download dialog box.

e. Enter the desired download time in the **Download start time** box.

MicroLab automatically calculates and sets the cradles' transmission times according to their ID numbers, so that the cradles will transmit the data successively.

f. MicroLab stores the data files in the following folder by default: C:\Program Files\Fourier Systems\MicroLab\MicroLog Data\Daily download. If you want to store your data in another location click **Browse** and navigate to the desired folder.

g. Click **OK** to return to the setup dialog.

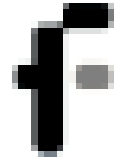
h. Click **Send setup**.

i. Repeat this procedure (except for steps d to g which should be performed only once) with every cradle. Remember to assign a different ID number to each cradle.

j. After you have finished setting up all your cradles, connect the RF receiver to the PC (see page 169).

k. Click **Logger** on the menu bar, then click **Com setup** to open the Communication setup dialog.

l. Make sure that the **Search for Receiver**



and Cradle checkbox is checked.

m. Click **Try to connect** to establish communication with the receiver.

n. Place the cradles at the desired data logging locations.

2. Automatic download

At the download's start time the cradles should be within 300m of the receiver and in its line of sight. The cradles will automatically transmit the data one after the other according to their ID number. The time interval between successive transmissions is two minutes.

MicroLab automatically saves the data after every transmission under the name: daily download [&date]. After the daily download

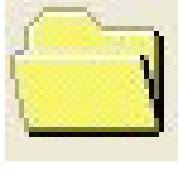
has been completed, the file will automatically be closed. Every 24 hours MicroLab creates new data file.

3. Manual transmission

If one of the cradles fail to transmit data automatically, or if you need to download all data from a specific cradle (not just data that was recorded during working hours) press the **Trs** (Transmit) button on the right side of the Cradle (see page 159). The cradle will then transmit all stored data to the PC.

4. Viewing Daily Download data and status

To open a daily download data file:

a. Click Open  on the main toolbar

b. Navigate to the folder in which the daily download data files are stored

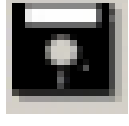
c. Double click the file name to open the file

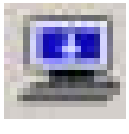
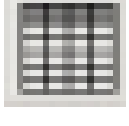
MicroLab prompts to a daily summary of the automatic download. The summary includes a list of the MicroLogs that have completed their data download, along with their respective cradle's battery level, transmission status and indication as to whether alarm levels were exceeded.

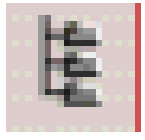
d. Click **OK** to close the summery window and to display the data.

1.4.7. Toolbar Buttons

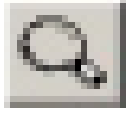
1. Main (upper) toolbar

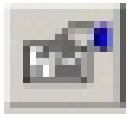
	Open	Opens saved files
	Save	Saves the data that is currently displayed
	Print…	Opens the Print Option dialog box
	Export	Exports the displayed data to an Excel spreadsheet.

	Run	Begins data recording.
	Stop	Stops data recording.
	Setup	Opens the Setup dialog box.
	Download	Downloads data from the MicroLog onto the PC.
	Graph	Displays or removes the graph
	Table	Displays or removes the table

	Data Map	Displays or removes the Data Map
	°C/°F	Displays the desired unit of temperature
	Alarm	Displays or removes alarm levels from the graph

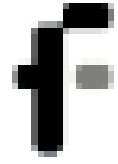
2. Graph (Lower) toolbar

	**Zoom in**	Activates the zoom tool

	Pan	Activates the pan tool
	Auto scale	Returns the graph to full view
	**Graph properties**	Opens the Graph Properties dialog box
	Cursor	Displays or hides the cursor

Chapter 2 MicroLog Plus

Chapter 2 MicroLog Plus



2.1. Overview

MicroLog plus enables wireless communication between a PC and up to 200 MicroLog devices simultaneously. Furthermore, real-time temperature and humidity readings from the MicroLog are automatically delivered directly to the PC. Data from external sensors can also be transmitted in the same manner. The complete MicroLog Plus system includes the MicroLog data logging device, the cradle that the data logger is mounted on, a small receiver that is placed on the PC, and the user-friendly software that allows for convenient central management.

MicroLog Plus uses MicroLog data loggers to record temperature and humidity readings. The cradle that the data logger is mounted on is a wireless transmitter that can transmit measurements to a PC from up to 300 meters. Since each cradle is tagged with an ID number, the cradles can be programmed to transmit data at various

time intervals based on the criteria defined in their IDs. This advanced feature prevents data collision between two or more loggers.

The **MicroLab Plus** software reports on the status of up to 200 MicroLogs on a single color-coded interface. Other features that help automate all aspects of the industrial data logging procedure include the ability to store the data of each MicroLog, to set MicroLog alarm levels and to define sampling intervals, as well as any other necessary parameters.

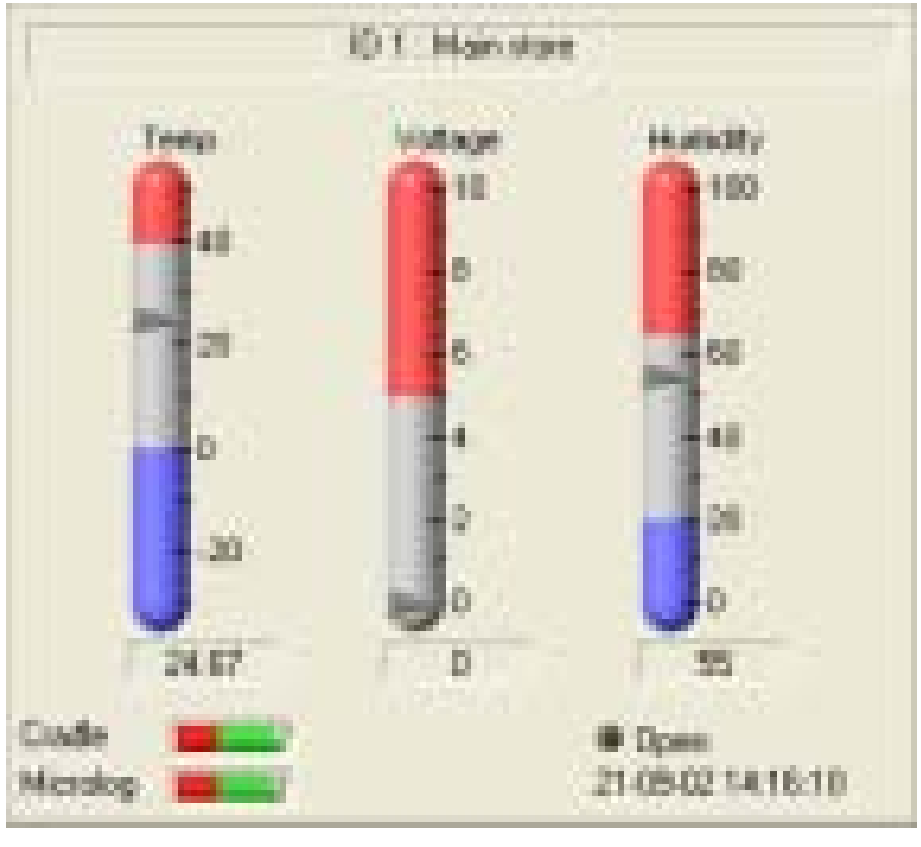
The **Logger** menu handles all communication between the PC and MicroLog such as programming the desired MicroLog and Cradle, calibrating sensors, as well as defining new sensors.

The **View** menu controls the various data display options. Online data can be viewed in multiple meters format (the default view), in multiple graph format, or Cradle map format. The stored data can be viewed on an off-line graph and table.

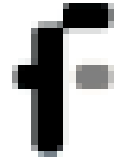
The **Offline Graph** menu contains all the commands needed to format and edit the graph.
The **Cradle Map** menu contains all the commands needed to setup and edit the map.
The **Multiple Graphs** menu contains all the commands needed to view and edit the graphs.
The most common tasks and commands are available as buttons on the **Main toolbar** (upper toolbar), the **Graph toolbar** (lower toolbar) and on the **Cradle map toolbar** (lower toolbar).

2.1.1. MicroLab Plus Default Window Layout

In Meters view (the default view), the data for each MicroLog is displayed in a separate window in a meter. There are six MicroLog windows in each display. The picture below represents an individual MicroLog display.



The blue and red zones on the meters represent the low and high alarm levels



2.2. Getting Started

2.2.1. Installation

1. System Requirements

To work with MicroLog Plus, your system should be equipped with the following:

Software

Windows 95, or later

Internet Explorer 4.0, or later (you can install Internet Explorer 5 when you install MicroLog Plus, since it ships with the product)

Hardware

Pentium 300MHz or higher.

32 MB RAM (64 MB recommended)

5MB available disk space for the MicroLog Plus application

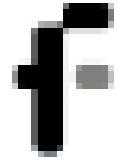
2. Install the Software

1. Insert the CD into your CD drive.
2. The installation will start automatically. Once the process begins, follow the on-screen instructions.
3. In case auto run is not working, open the CD drive folder and double-click the setup icon, then follow the on-screen instructions.

To un-install the software: From the Start menu select Settings / Control Panel, and use the Add/Remove programs function to remove the MicroLab Plus application.

2.2.2. Setup the MicroLog Plus System

Before you start using the MicroLog Plus System you must connect each Cradle to the PC using the serial communication cable and set it up. Follow the steps below to setup your system:



1. Mount the MicroLogs onto the cradles
2. Open the MicroLab Plus software
3. Connect the first cradle to the PC (see page 159)
4. Set up the first MicroLog data logger (see page 128)
5. Disconnect the first cradle from the PC
6. Repeat steps 3 – 5 with each cradle

Note: When setting up multiple Cradles we recommend to use the Auto Setup tool (see page 137).

7. Connect the RF receiver to the PC
8. Click **Logger** on the menu bar, then click **Com setup** to open the Communication setup dialog.
9. Click **Try to connect** to establish communication with the receiver.

10. Place the cradles at the desired data logging locations

2.2.3. Saving data

There is no need to save data manually as the data is saved automatically every half an hour in the MicroLog Data folder: C:\Program Files\Fourier Systems\MicroLab Plus\MicroLog Data, however, you can change the file location.
MicroLab Plus creates a folder for each MicroLog naming it with the cradles ID number and stores the MicroLog's data in this folder.
MicroLab Plus creates a new data file for each MicroLog every 24 hours at midnight.
By default the data is saved in MicroLab Plus file format (.MPD – MicroLog Plus data). If you want to use the data in another program you can save it in text files (.CSV – comma separated

values). The data can be saved in either one of, or both the file formats.

To select file format and location:

1. Click **File** on the menu bar, then click **Stored data folder…**
2. To save data in MicroLab plus file format check the **Save MicroLab Plus files** check box
3. To change the file location, click **Browse** and navigate to the desired folder
4. To save the data in text file format Check the **Save text files** check box
5. To change the file location, click **Browse** and navigate to the desired folder
6. Click **OK**

Note: If you want to remove unwanted data, apply the crop tool (see page 125).

2.2.4. Activate Sound Alarm

Click **Enable Alarm** on the main toolbar to activate sound alarm.
If any MicroLog records a reading that exceeds its alarm levels, the MicroLab Plus's alarm will sound.
The alarm will sound as long as the MicroLog readings exceeds the alarm levels.
Click **Enable Alarm** a second time to disable the Alarm.

Note: To activate the Cradle alarm, use the Setup dialog box

2.2.5. E-mail Alarm Notification

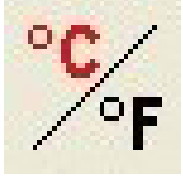
MicroLab Plus can be programmed to send e-mail notifications to one, or more e-mail addresses whenever any MicroLog readings exceed its alarm levels. The notifications include the MicroLog name, the sensor whose alarm level was exceeded and the sensor's measured value.

To setup MicroLab Plus in order to send e-mail notifications:

1. Click **File** on the menu bar, then click **Mail properties**.
2. Check the **Send e-mail notification** check box.
3. In the **Server name** box, type the outgoing mail server name (mandatory).
4. In the **To** box, type the e-mail address of each recipient, separating names with a semicolon (;) (mandatory).

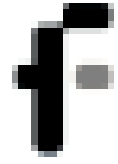
5. In the **From** box, type your e-mail address (mandatory).
6. Click **OK**.

2.2.6. Change the temperature units

Click **Toggle °C/°F** button 

to change the temperature scale from Fahrenheit to Celsius and vice versa.

Note: To change the units in the MicroLog display, use the Setup dialog box or the **Logger** menu



2.2.7. Display Properties

You can change the way numbers and dates will be displayed on screen.

1. Click **File** on the menu bar, then click **Display properties**.
2. In the **Decimal place settings**, enter the number of decimal places you want to display (Enter a number between 0 and 4) for each sensor.
3. In the **Date format settings** select the desired format option.
4. Click **OK**.

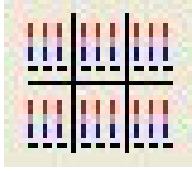
2.3. Online Mode

2.3.1. Display options

Online data can be displayed in

- Meters View (the default view), in which the current data is displayed in meters
- Multiple graph View, in which the data from the last 24 hours is displayed in graphs
- Cradle Map format, where the MicroLogs are represented by color coded icons

2.3.2. Meters view

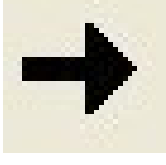
Click **Meters**  on the main toolbar to switch to Meters view.

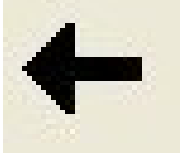
In Meters view (the default view), the data for each MicroLog is displayed in a separate window in meters. The number of active meters in the window corresponds to the number of active sensors in each MicroLog. the meters are updated every time MicroLab Plus receives new data.

If a MicroLog is inactive the corresponding window becomes gray and disabled.

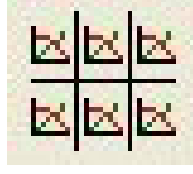
There are six MicroLog windows in each display. If you are using more than six MicroLogs, you can manually scroll to the other displays, or let MicroLab Plus do this automatically.

- Click **Auto scroll** on the main toolbar to allow automatic scrolling.
- Click **Auto scroll** a second time to return to manual scrolling.

- Click **Scroll forward**  on the main toolbar to scroll to the next MicroLogs display.

- Click **Scroll back**  on the main toolbar to scroll to the previous MicroLogs display.

2.3.3. Multiple graphs View

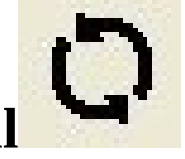
Click **Multiple graphs**  on the main toolbar to switch to Multiple graphs view.

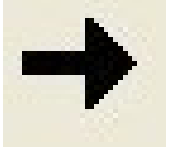
In Multiple graphs view, the data for each MicroLog is displayed in a separate window in graphs. The graphs display the data sets plotted versus time. In order to keep the graph clear and simple, only two Y-axes can be shown on the graph simultaneously. If there are three curves in the graph, one of the Y-axes will be hidden. To make this axis visible, select the corresponding plot with the cursor.

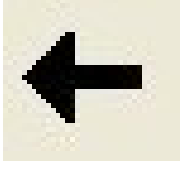
You can identify the Y-axis by its color, which matches the plot color.

The graphs are updated every time MicroLab Plus receives new data. If a MicroLog is inactive the corresponding window becomes gray and disabled.

There are six MicroLog windows in each display. If you are using more than six MicroLogs, you can manually scroll to the other displays or let MicroLab Plus do it automatically.

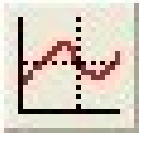
- Click **Auto scroll**  on the main toolbar to allow automatic scrolling.
- Click **Auto scroll** a second time to return to manual scrolling.

- Click **Scroll forward**  on the main toolbar to scroll to the next MicroLogs display.

- Click **Scroll back**  on the main toolbar to scroll to the previous MicroLogs display

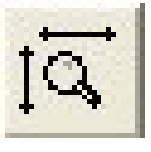
1. The Cursor

Use the cursor to view individual data recording values, or to reveal a hidden Y-axis.

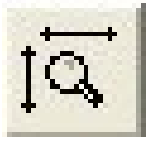
To display the cursor, click **Cursor**  on the graph toolbar. You can drag the cursor with the mouse to any other point on the plot, or to another plot altogether.
The point coordinates of the selected data recording will appear in the information bar at the bottom of the graph window.

2. Zooming

1. Click **Zoom in** on the graph toolbar and drag the cursor diagonally to select the area you want to magnify. Release the mouse button to zoom in to the selected area.
2. Click on the **Zoom in** button a second time to turn off the Zoom tool.

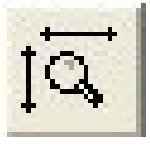
To restore auto scaling, click **Autoscale**  .

3. Autoscale

Click **Autoscale** button  on the graph toolbar for the full data display.

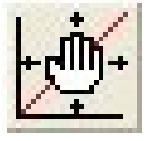
4. The stretch/compress axis tool

Move the cursor onto one of graph axes. The cursor icon changes to double arrow symbol (⇔), indicating that you can stretch or compress the axis scale. Drag the symbol to the desired location. Repeat the procedure for the other axis if necessary.

To restore auto scaling, click **Autoscale**  .

5. Panning

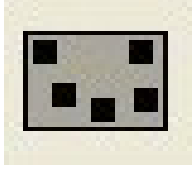
Use the pan tool after zooming view any part of the graph that is outside the zoomed area.

To do this, click **Pan**  on the graph toolbar, then click anywhere on the graph and drag the graph to view another area. Click **Pan** a second time to turn off the Pan tool.

6. Display alarm levels

1. Click **Display alarm level** .
2. Select the sensor you wish to display from the **select sensor** drop list

2.3.4. Cradle Map

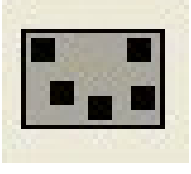
Click **Cradle Map**  on the main toolbar to display the Cradle Map.

In Cradle Map, each MicroLog is represented by an icon. Each icon carries the MicroLog's individual ID number. When the MicroLog is active, the icon's color is green. If the recorded data exceeds either of the alarm levels, the icon's color turns to red. Move the cursor over an icon to display the MicroLog's name.

Double click on any MicroLog icon to display its meters window, which is identical to its window in the Meters view format. To close the meters window, click Close at the upper right-hand corner of the window.

Before using the Cradle Map, you must set it up and then lock it.

1. Setting up the Cradle Map

- Click **Cradle Map**  on the main toolbar to display the Cradle Map.
- Click **Cradle Map** on the menu bar, then click **Display toolbar** to display the Cradle Map toolbar.
- Click **Lock View** on the Cradle Map toolbar to unlock the Cradle Map.

Add icons

Add icons to match the number of MicroLogs you are using.

- Click **Add cradle** on the Cradle Map toolbar to add a new icon or click the down arrow button next to it to add a group of 5, 10 or 15 icons.

- Use the **Remove cradle** button or the down arrow next to it to remove icons.

Load a picture

You can arrange the icons on a picture or plan of your working space, so that each icon represents the corresponding MicroLog's actual location in the working space. First, load the picture into the program:

1. Click **Load picture** on the Cradle Map toolbar

2. Locate the picture file you want to load
3. Double-click on the file

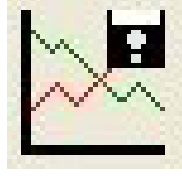
Now you can click and drag the MicroLog icons to their desired locations on the picture.

Lock Cradle Map

After you have finished arranging the icons, click **Lock View** on the Cradle Map toolbar to prevent any accidental change in the icon arrangement.

2.4. Offline Mode

2.4.1. Offline screen

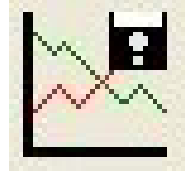
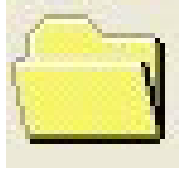
Click **Offline**  on the main toolbar to switch to Offline mode.

MicroLab plus's Offline screen consists of two parts: the graph and the table. The data in the table always matches the data that is currently displayed on the graph.

2.4.2. Open files

In Online mode the received data is displayed on-line both in graphs and in meters.

To display previously saved data, switch to off-line mode:

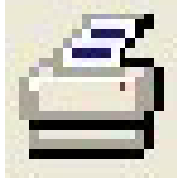
1. Click **Offline**  on the main toolbar.
2. Click **Open**  on the main toolbar.
3. Enter the desired cradle ID number.
4. Select a date in the **From** box.
5. Select a date in the **To** box.
6. Click **OK**.

That will load all the data between the dates you selected and display it in graph and table display.

2.4.3. Print

1. Print a graph

You can print saved data in Offline mode

1. Click **Print**  on the main toolbar to open the Print Options dialog box.
2. Click the **graph** option.
3. Click **Print** to open the Print Dialog Box.
4. Click **OK**.

2. Print a table

You can also print saved data as a table in Offline mode.

The table will include data as well as the MicroLog name, serial number and the alarm level setup. Data that exceeds any of the alarm levels will be highlighted by arrows.

1. Click **Print** on the main toolbar to open the Print Options dialog box.
2. Click the **Table** option.
3. If you want to print only part of the data, uncheck the check box and select the desired time and date in the **from** and **to** boxes.
4. Click the **Print** button to open the Print dialog box.
5. Click **OK**.

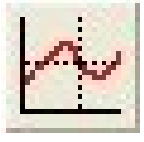
2.4.4. Graph display

1. Graph

The graph displays the data sets plotted vs. time.
In order to keep the graph clear and simple, only two Y-axes can be shown on the graph simultaneously. If there are three curves in the graph, one of the Y-axes will be hidden. To make this axis visible, select the corresponding plot with the cursor.
You can identify the Y-axis by its color, which matches the plot color.

2. The Cursor

Use the cursor to view individual data recording values, or to reveal a hidden Y-axis.

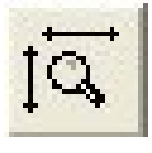
To display the cursor, double click on an individual data point or click **Cursor**  on the graph toolbar. You can drag the cursor with the mouse to any other point on the plot, or to another plot altogether.
The point coordinates of the selected data recording will appear in the information bar at the bottom of the graph window.

3. Zooming and Panning

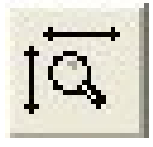
Manual Scaling

1. Click **Graph Properties** on the graph toolbar to open the Graph Properties dialog box.

2. Select the **Scale** tab, and choose the axis you want to scale in the **select axis** drop list.
3. Un-check the Autoscale check box and enter the new values in the edit box
4. In the time axis, you can either enter the time and date manually, or select it with the up and down arrow buttons.
5. Click **OK**.

To restore auto scaling, click **Autoscale**  .

Autoscale

1. Click **Autoscale** button  on the graph toolbar for the full data display.
2. Double-click on an individual axis to autoscale it separately.

Default Zooming

If you usually need to view a specific time frame (i.e. work-day hours) use the Default zooming tool. You can set the start and end time of the time span and then use it whenever you open a file or download data from the MicroLog.

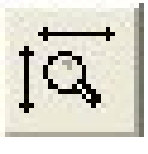
To set the default zoom:

1. Click **Graph Properties** on the graph toolbar, then click **Set Default Zoom**.
2. Enter the start and end times, then click **Set**.

To zoom to the default zoom:

1. Click **Graph Properties** on the graph toolbar.
2. Check the **Use default zoom** check box and click **OK**.

Every file and every data recording you download will automatically open in the default zoom as long as the **Use default zoom** check box remains checked.

To restore auto scaling click **Autoscale**  .

4. Crop the data

Cropping enables you to trim the edges of a data set. Use it to remove unwanted data:

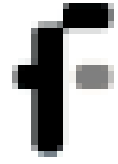
1. Zoom to the data range you want to keep.
2. Click **Offline Graph** on the menu bar, then click **Crop**.

All data outside the zoomed area will be **permanently** removed.

5. Format the graph

You can change a data line's color, style or width. You can also add markers that represent the data points on the graph and format their style and color.

The Y-axis color matches the corresponding plot's color and will change accordingly. The time axis color can be changed separately:



1. Click **Graph Properties** on the graph toolbar to open the Graph Properties dialog box.
2. Select the **Lines** tab, then select the plot or axis you want to format in the **select plot** drop list.
3. From here you can format the line's color, style and width, as well as the markers' color and style. To remove the line or the marker, un-check the corresponding **visible** check box.

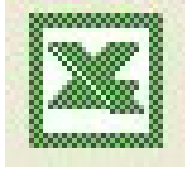
To restore the default formatting, click the **Restore default** button, and click **OK**

6. Copy the graph as a picture

You can copy the graph to the clipboard as a picture and then paste it to other Windows' programs, such as Word and PowerPoint:

1. On the **Offline Graph** menu, click **Copy graph**.
2. Open the destination file.
3. In the destination file, right click and select **paste**.

2.4.5. Export data to Excel

Click **Export to Excel**  to export the currently displayed data to an Excel spreadsheet.
MicroLog Plus will open a new Excel workbook displaying the data along with the MicroLog info, including the MicroLog name, serial number and alarm levels setup.

2.5. Program MicroLog

2.5.1. Setup

Use the Setup dialog box to view or to change the MicroLog and the Cradle settings

When setting up multiple Cradles use the **Auto Setup** tool (see page 137).

To save the settings for future use, activate the **Save setup** tool (see page 139).

1. Connect the Cradle to the PC

2. Click **Setup**

on the main toolbar to open the Setup dialog box.

The dialog box is made up of five sections:

MicroLog info

Comment

Click the **edit** box and type a name that will serve to identify the specific MicroLog (e.g. its location).

S/N

Displays the MicroLog's serial number

Battery Level

If the indicator is in the red zone the battery should be replaced.

Cradle info

Cradle ID

The cradle's identification number sets the cradle's transmission time in daily download mode.

Battery Level

If the indicator is in the red zone the battery should be replaced.

Setup

Temperature

Click the **Temperature** check box to activate the internal temperature sensor

Humidity

Click the **Humidity** check box to activate the internal humidity sensor

External

Click on the **External** check box to activate the external sensor option, and then select a sensor in the drop list.

Cradle contact

Click the **Cradle contact** check box to activate the cradle contact

The sensors' current readings will appear in the labels next to the sensor name, once the MicroLog begins logging for the first time.

Temperature unit

To set the temperature unit in the MicroLog display, select the option you want (Celsius or Fahrenheit).

Interval

Determines the logging interval, or the time interval between successive data recordings.
The time format is hh:mm:ss. Set the time setting to select a recording time interval from between 10 seconds and 2 hours. For example, to set a time interval of one hour, five minutes and thirty seconds, click the hours (hh) and type 1 or use the arrows to select 01, then click the minutes (mm) and type 5 or use the arrows, and finally, click the seconds (ss) and type 30 or select 30 using the arrows.

Timer run

Click the **Timer run** check box if you want MicroLog to start recording at a predetermined time. This option is convenient if you are using

several MicroLogs at once and want them to all begin logging at the same time.
Use the time and date selectors to set the start time.

Cyclic run

In **Cyclic run** mode, MicroLog overwrites the old measurements (starting with the oldest one) once the MicroLog's memory is full. Click the **Cyclic run** check box to operate in this mode.

Use this mode if you intend to operate the system continuously.

If the check box is clear, MicroLog will operate in **Normal run** mode and will stop recording when the memory is full.

Alarm levels

Type in the desired minimum and maximum alarm levels. If MicroLog records a reading that exceeds either of these levels, the software's alarm will sound, the MicroLog's LCD will start to flash and the cradle's alarm will sound. To stop the LCD's flashing, press either of its two keys. To stop the cradle's alarm, press both the MicroLog's keys simultaneously.

The default alarm levels are the lower and upper ends of the sensors. Click **Cancel Alarm** to restore the default levels.

Cradle time settings

Workday hours

Use the up and down arrow buttons to set the daily period when you want the Alarm and/or the Daily Download to be active, or type the desired period in manually.

Alarm delay

Click the drop list to select the time delay between the time MicroLog records a reading that exceeds the alarm levels and the time the alarm will sound.

Alarm duration

Click the drop list to select the time for which the alarm will operate before it stops automatically.

Complete the setup

Click **Send setup** to send the new settings to MicroLog, which will complete the setup. Click **Cancel** if you don't want to change the setup.

Note: The **Send setup** command erases all existing data in the MicroLog, and it will automatically begin recording.

If you set it to **Timer run** mode, MicroLog will wait in standby mode displaying , and will begin recording at the specified time.

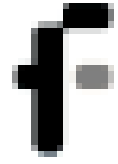
2.5.2. Auto setup

When setting-up multiple Cradles use the Auto Setup tool. This tool will automatically set the minimum logging interval, depending on the number of units you are using, and set the start time for each unit.

To perform auto Setup:

1. Connect the first Cradle to the PC
2. Click **Logger** on the menu bar, then click **Auto Setup**
3. In the **Number of units** drop list select the number of Cradles you are setting up, then click **Start**
4. Set up the first unit as you would normally

Note: the minimum logging interval is already set in the Interval box and you cannot select a shorter time interval



5. Click **OK**
6. Click **Send**

After setup is completed the Auto Setup tool is ready to setup the second unit (notice that the title bar on the Auto Setup dialog has changed to 'Unit 2')

7. Connect another Cradle to the PC
8. Change the comment (optional).
9. Click **Send**
10. Repeat this procedure with every cradle

To change the settings of a specific unit click **Edit** on the Auto Setup dialog and select the new settings before executing the Send command. These settings will be saved until the next time you change them.

Use the **forward arrow** and **backward arrow** buttons on the Auto Setup dialog to navigate to a specific unit. Notice that this will change the automatic sequence

2.5.3. Saving setup

When setting up multiple Cradles use the **Save Setup** option in the **Setup** dialog.

1. After you have finished the settings selection of the first Cradle and before sending the setup command, click **Save setup**. This will save all the setup settings.

2. Connect another Cradle to the PC, click **Setup** on the main toolbar, then click **Load Setup** to load your setup settings.
3. Change the Cradle ID
4. Change the comment (optional).
5. Click **Send Setup**.

2.5.4. Defining a custom sensor

You can use MicroLog with any sensor that has a 0 – 20mA current output or a 0 – 10V voltage output.

1. Click the **Logger** menu and then select **Define New Sensors** to open the Define New Sensor dialog box.
2. Click **Add** to add a new sensor to the list.

3. In the **Based On** drop list, select an external sensor that matches your sensor's output
4. Type the sensor's name in the **Sensor Name** edit box.
5. Type the sensor's unit in the **Sensor Unit** edit box.
6. In the Calibration Values section, enter two values of your sensor that correspond to the base sensor values. For example, see the definition for a 0 – 100mbar pressure sensor whose output is 0 – 20mA:

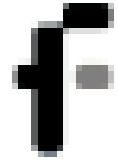
7. Click **OK**.

The new sensor will then appear in the **External Sensor** list in the **Setup** dialog box.

2.5.5. Sensor calibration

A new MicroLog comes fully calibrated. After a period of long use, however, you may want to re-calibrate the humidity or the temperature sensors.

The humidity calibration affects both MicroLog and MicroLog plus and should be carried out while MicroLog is connected to the PC. The temperature calibration affects only the MicroLog Plus software and can be carried out regardless of whether MicroLog is connected to the PC.



1. Calibration password

To prevent accidental change of the calibration, the calibration procedure is protected by a password. The default password is: 1234. To change the password:

1. Click **Logger** on the menu toolbar, then click **Calibration**.
2. Click **Change Password** to open the Change Password dialog box.
3. Enter the current password in the **Current Password** edit box.
4. Enter the new password in the **New Password** edit box.
5. Enter the new password a second time in the **Confirm New Password** edit box to confirm your new password.
6. Click **OK**.

Note: The password must include at least 4 characters and is **case sensitive.**

2. Humidity calibration

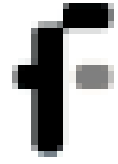
To calibrate the humidity sensor you will need a humidity chamber.

1. Connect the MicroLog to the PC
2. Set up the MicroLog to record every 10 seconds (see page 128).
3. Click **Logger** on the menu bar, then click **Calibration.**
4. Enter the calibration password, then click **OK**.
5. Select **Humidity** in the **Choose sensor** drop list

6. Click **Default** to restore the original values

7. Disconnect MicroLog from the PC and insert it into the humidity chamber.
8. Set the humidity chamber to the first reference value. Wait until the humidity level is stabilized and write down the MicroLog's reading.
9. Repeat the last step with the second reference value.
10. Connect the MicroLog to the PC.
11. Enter the two reference values into the **MicroLog Value** edit boxes.
12. Enter the two MicroLog values into the **Reference Value** edit boxes.
13. Click **Calibrate**.

To restore default calibration, click **Default**.



3. Temperature calibration

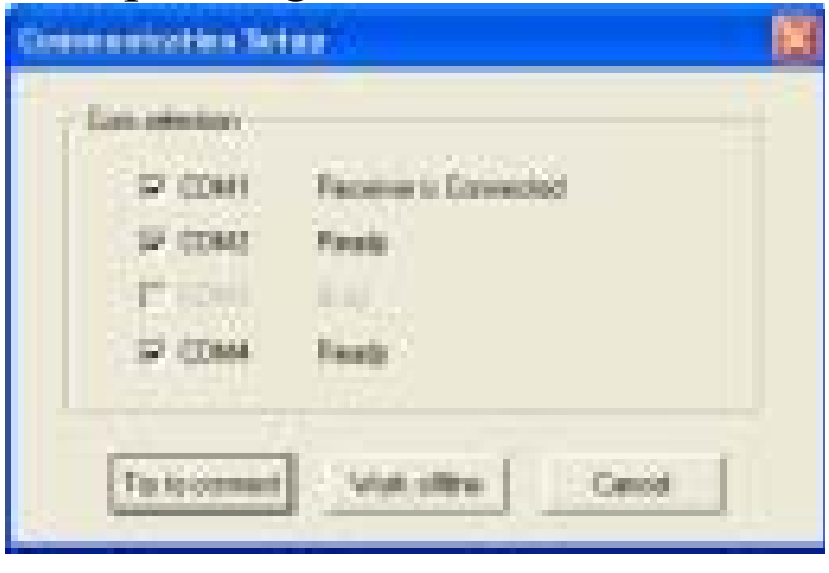
1. Click **Logger** on the menu bar, then click **Calibration.**
2. Enter the calibration password, then click **OK**.
3. Select **Temperature** or **Ext. Temperature** in the **Choose sensor** drop list.
4. Click the **Default** button to restore the original values.
5. Enter the two reference values into the **MicroLog Value** edit boxes.
6. Enter the two MicroLog values into the **Reference Value** edit boxes.
7. Click **Calibrate**.

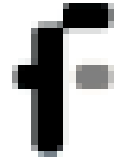
To restore default calibration, click **Default**.

2.5.6. Communication setup

Communication between a PC and a MicroLog take place automatically whenever you send a command to MicroLog. However, the Communication Setup dialog box can be used for more advanced communication options.

Click on the **Logger** menu and then select **Com setup** to open the Communication Setup dialog box:

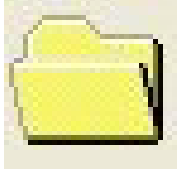




The checked COM ports are available for communication.
Click **Try to connect** to establish communication.
Click **Work off-line** to work with saved files.

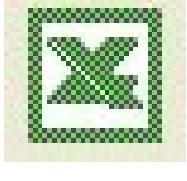
2.6. Toolbar Buttons

2.6.1. Main (upper) toolbar

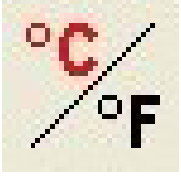
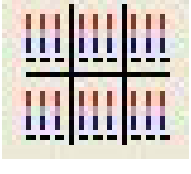
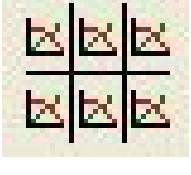


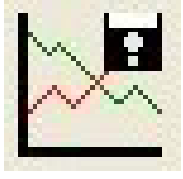
Open Opens saved files (enabled only in Offline View)

Print… Opens the Print Option dialog box (enabled only in Offline View)

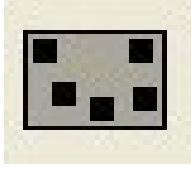


Export Exports the displayed data to an Excel spreadsheet. (enabled only in Offline View)

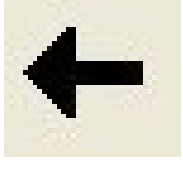
	Setup	Opens the Setup dialog box.
	**°C/°F**	Displays the desired unit of temperature
	**Meters View**	Displays Meters View
	**Multiple graphs View**	Displays Multiple graphs View



Offline View Displays Offline View

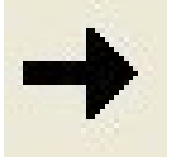


Cradle Map Displays Cradle Map



Scroll back Scroll to the previous MicroLogs display (enabled only in Online View)

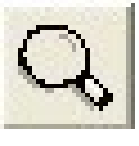
Auto-scroll Automatic scrolling between MicroLogs displays (enabled only in Online View)



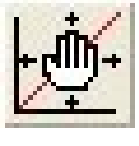
Scroll forward Scroll to the next MicroLogs display (enabled only in Online View)

Alarm Enables or disables sound alarm

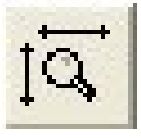
2.6.2. Graph (Lower) toolbar



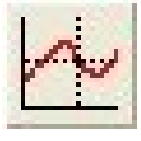
Zoom in Activates the zoom tool



Pan Activates the pan tool

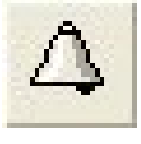


Auto scale Returns the graph to full view



Cursor Displays or hides the cursor

Graph properties Opens the Graph Properties dialog box (only in Offline view)



Alarm levels Displays or removes alarm levels from the graph

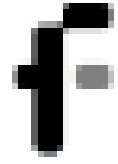
Alarm level selection box

2.6.3. Cradle Map (lower) toolbar

In Cradle Map view, click **Cradle Map** on the menu bar, then click **Display toolbar** to display the Cradle Map toolbar.

	Lock	Locks or unlocks Cradle Map
	Add Cradle	Adds Cradle icon to Cradle Map
	Remove Cradle	Removes Cradle icon from Cradle Map
	Load picture	Inserts a picture to Cradle Map

Chapter 3 The Cradle



3.1. MicroLog Cradle Line

1. Alarm Cradle

Accommodates an additional external sensor and RS 232/USB Computer Serial Interface, as well as a hardware alarm that operates sound alarm

Catalog number DT174

2. Wireless Cradle with Alarm

A wireless cradle that can accommodate additional external sensor and RS 232/USB Computer Serial Interface, as well as a hardware alarm that operates sound alarm.

Catalog number DT175

3.2. Operating the Cradle

1. Place the MicroLog in the cradle so that its rear connection socket fits into the plug on the cradle.

3. External sensor input

2b. USB socket

Trs button

4. DC power input

Led indicator

2a. RS232 serial communication socket

Figure 6: MicroLog and Cradle

To set up MicroLog (see Figure 6 above):

1. Mount MicroLog onto the cradle (1).
2. Connect the cradle to the PC using either serial or USB communication cable (2).
3. Run your MicroLog's software and use the setup command.

To prepare the wireless cradle to transmit data:

1. Set up MicroLog (see above).
2. Connect an external sensor if needed (see 3 in Figure 6 above).

The cradle will automatically transmit data online or once a day depending on how it was set up.

See page 90 for more on online transmission or page 78 for more on Daily Download.

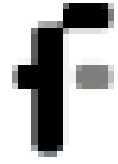
When the cradle transmits data the LED indicator lights up in a green light.

To manually transmit data to the PC:

Press the **Trs** (Transmit) button on the right side of the Cradle. The Cradle will then transmit all stored data to the PC.

To activate the Sound Alarm feature:

You **must** connect the AC power adaptor (see 4 in Figure 6 above). When the alarm operates the LED indicator lights in red light.



3.3. Replace the Battery

The cradle is powered by its internal battery or by external AC adaptor. The cradle battery's maximum lifespan is approximately 100,000 transmissions (for example, if the recording rate is once every 15 minutes the battery's lifespan is approximately 3 years.

The Cradle’s battery is a 1/2AA 3.6V lithium battery

1. Unfasten the four screws at the back of the cradle.
2. Carefully rotate the cradle
3. Remove the front cover and replace the battery. Be sure to insert the new battery in the correct corresponding polarities (look for the **“+”** symbol next to the positive terminal)

4. Replace the front cover, turn the cradle over and refasten the four screws at the back of the cradle.

3.4. Screw Terminals

The cradle is equipped with eight screw terminals for permanent connections to the cradle. These terminals include:

Connection to external sensor: Identical to the cradle's external sensor socket.

Contact sensor (DT175 only): This cradle sensor (in addition to the usual external contact sensor) monitors Reed Relay contacts and switch status (open/closed) to identify the correlation between phenomena such as temperature change and door status. This

sensor's data is stored in the cradle's memory and is available only through wireless transmission.

External control switch: Closes an external control circuit when sensor readings exceed alarm levels. Maximum load: 30VDC, 1A.

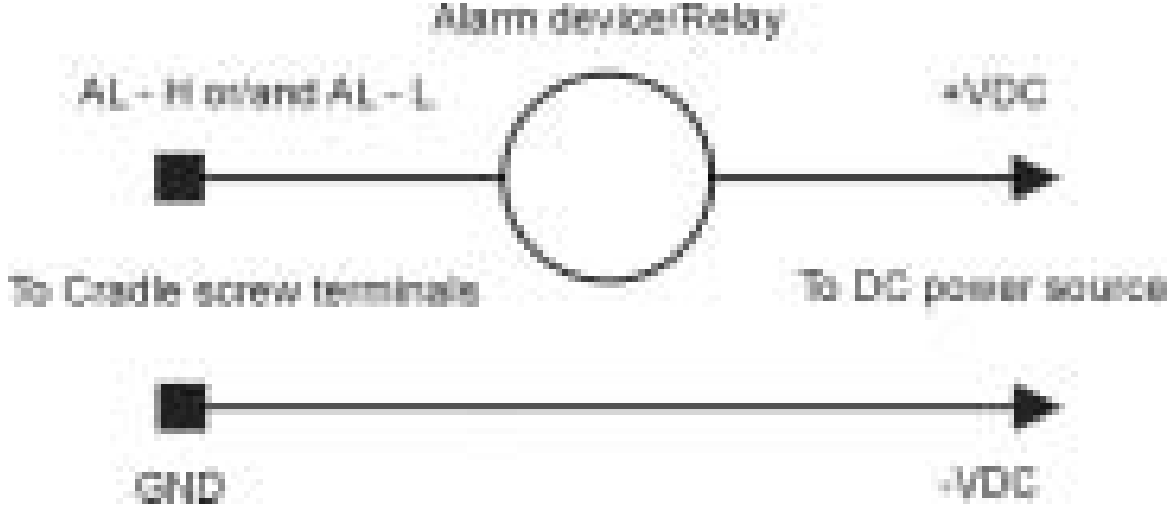


Figure 7: external control switch wiring diagram

You can wire one alarm device for High alarm level (AL – H terminal) and another alarm device for the low alarm level (AL – L terminal), or you can connect the same device to both terminals so it will operate whenever any of the alarm level is exceeded.

If you want to operate an alarm device that consumes more than 30VDC, 1A or an AC alarm device. You will have to use a relay.

External power: Connection to an external 12VDC power supply (i.e. vehicle battery).

To connect to the screw terminals:

1. Unfasten the antenna screw at the top back of the cradle.
2. Remove the antenna.

3. Unfasten the four screws at the back of the cradle.
4. Remove the back cover and break the oval seal at the bottom of the back cover by pressing it with a screwdriver.
5. Replace the back cover.
6. Carefully rotate the cradle.
7. Remove the front cover.
8. Insert the external wires through the oval opening you have broken at the back cover and fasten them to the appropriate screw terminals (see picture and table below)
9. Replace the front cover, turn the cradle over and refasten the four screws at the back of the cradle.

10. Replace the antenna and fasten the antenna screw.

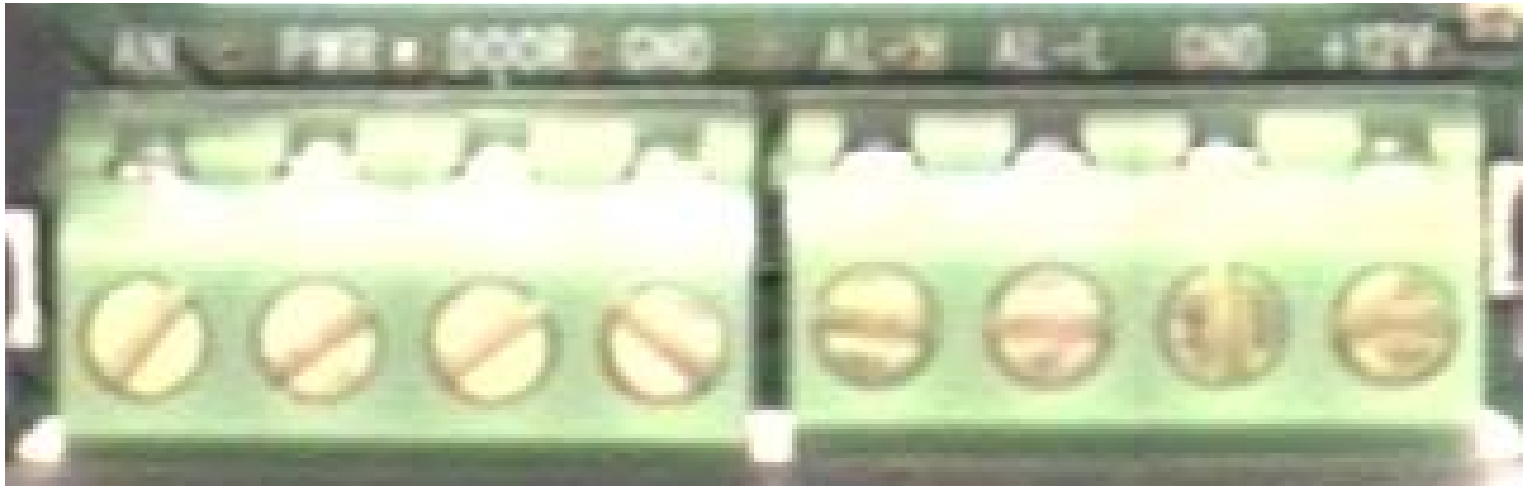


Figure 8: Cradle's screw terminals

The table below lists the various screw terminals according to their labels (from left to right) that are printed above the terminals:

Label (Left to right)		**Function**
1 2	AN PWR	External sensor (+Ground)
3 4	DOOR GND	Contact sensor (online only)
5 6	AL–H AL–L	External control switch (30VDC, 1A)
7 8	GND +12V	External power

Chapter 4 The Receiver

When the receiver is connected to a PC, it enables any MicroLog connected to a cradle to send data to the PC without the need for a connection cable.

Connect the AC/DC adaptor to the AC Adaptor socket at the bottom of the receiver (see Figure 9)

Connect the serial communication cable (DT175): Connect the stereo phone jack to the PC cable socket at the bottom of the receiver and the type D 9-pin plug to a free serial port on your PC.

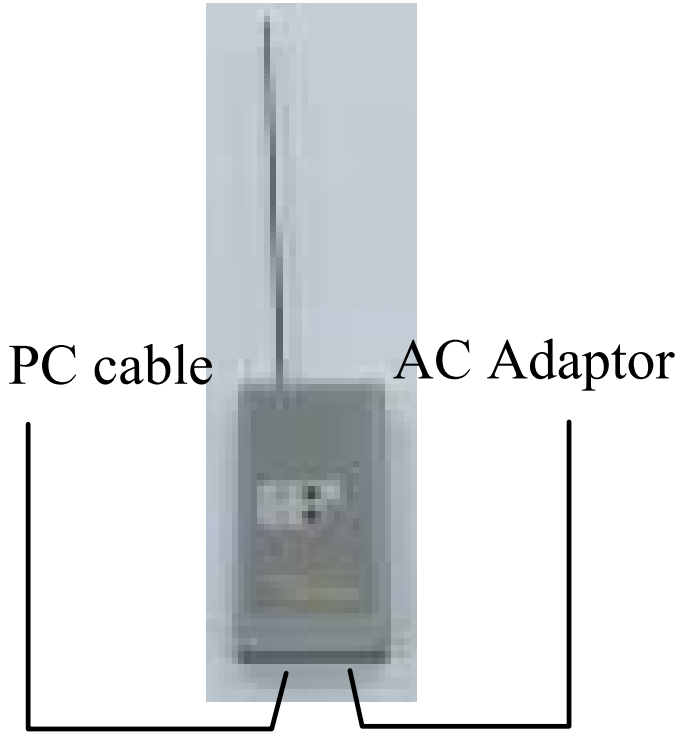
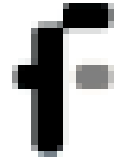


Figure 9: the Receiver

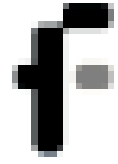


The receiver automatically starts receiving data from any active MicroLogs, and transfers the data to the MicroLog Plus program.

Chapter 5 External Magnet Antenna

For use with the Cradle and/or receiver

Chapter 5 External Magnet Antenna



The external antenna is equipped with a magnet clamp for easy mounting on metallic surfaces. Just plug the antenna to the Cradle or receiver, place the magnet antennae in a location where transmission is most accessible (e.g. on the roof of a truck) and you are ready to go.

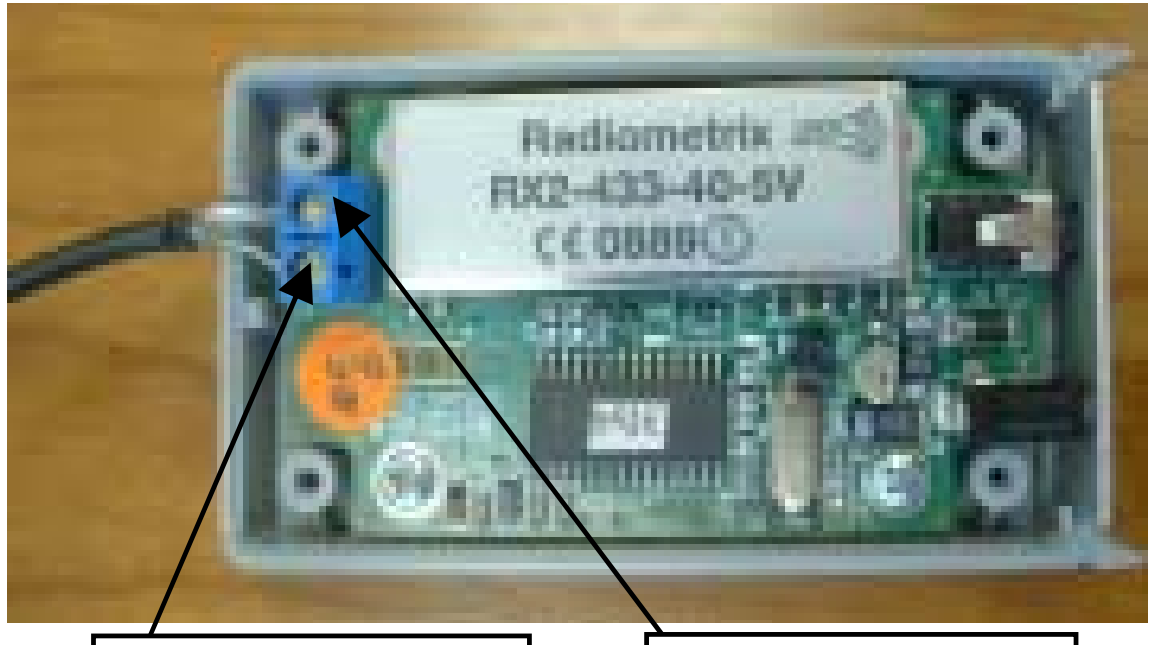
Use the external antenna in case where the:

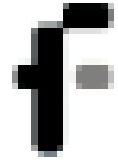
- Cradle or receiver is located in metal chambers (like refrigerators)
- Cradle or receiver is located indoors for protection from harsh environmental conditions and rain

The external antenna is designed for 914MHz and 433MHz carriers The antenna adds a 1-3dB gain to the Transmitter-Receiver path. With the use of an external antenna on both Cradle and receiver we

manage to maintain a constant data reception from the Cradle at distances of 360m with no line of sight.

5.1. Connecting the antenna to the receiver





1. Open the receiver case, by releasing the four screws on the receiver back
2. Remove the wipe antenna from the screw terminal
3. Connect the antenna hot wire to the right terminal of J1 (wipe antenna location)
4. Connect the antenna shield wire to the left terminal
5. Close the receiver using its four screws

5.2. Connecting the antenna to the Cradle

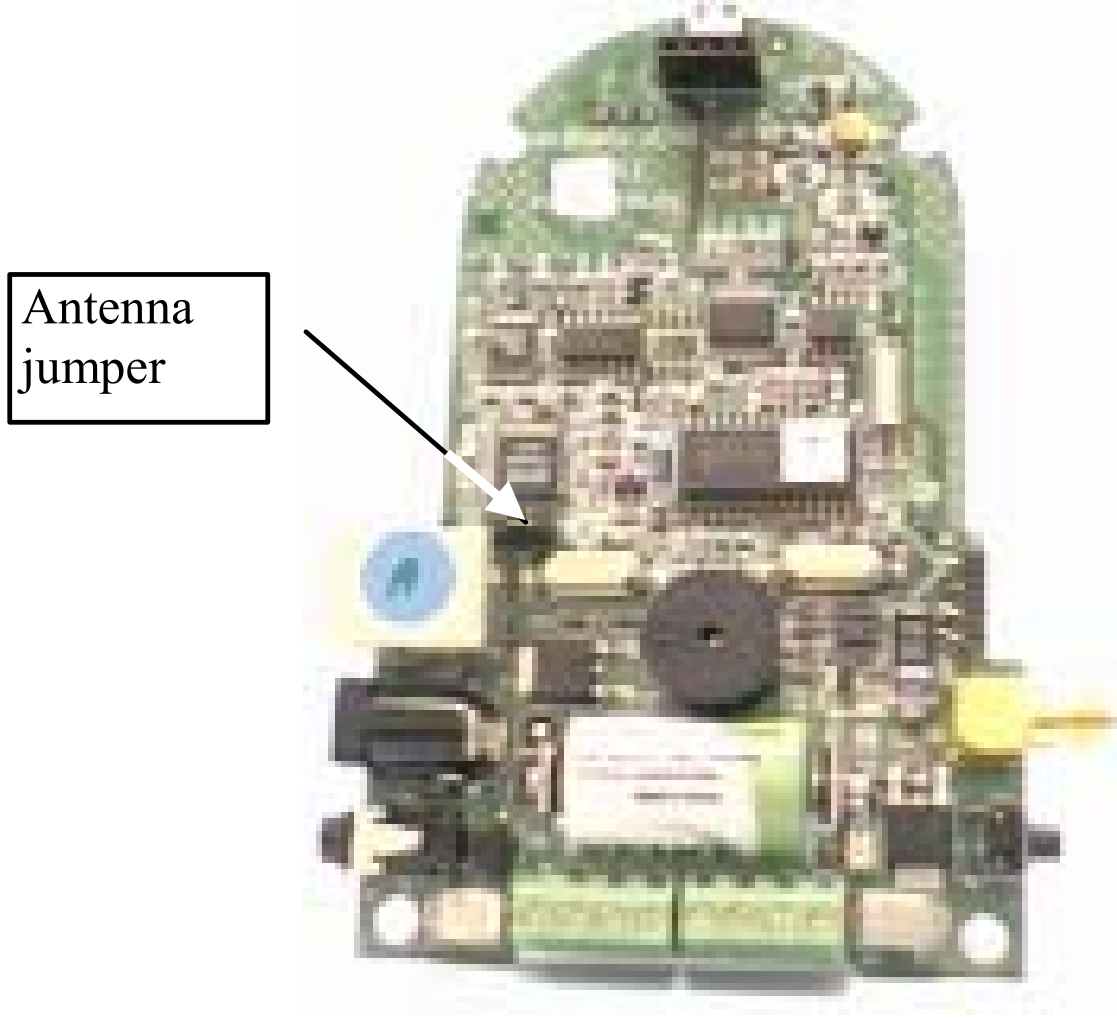
All Cradles produced after March 2003 have an SMA connector on their right side.

To use the external antenna, only screw the antenna to the SMA connector

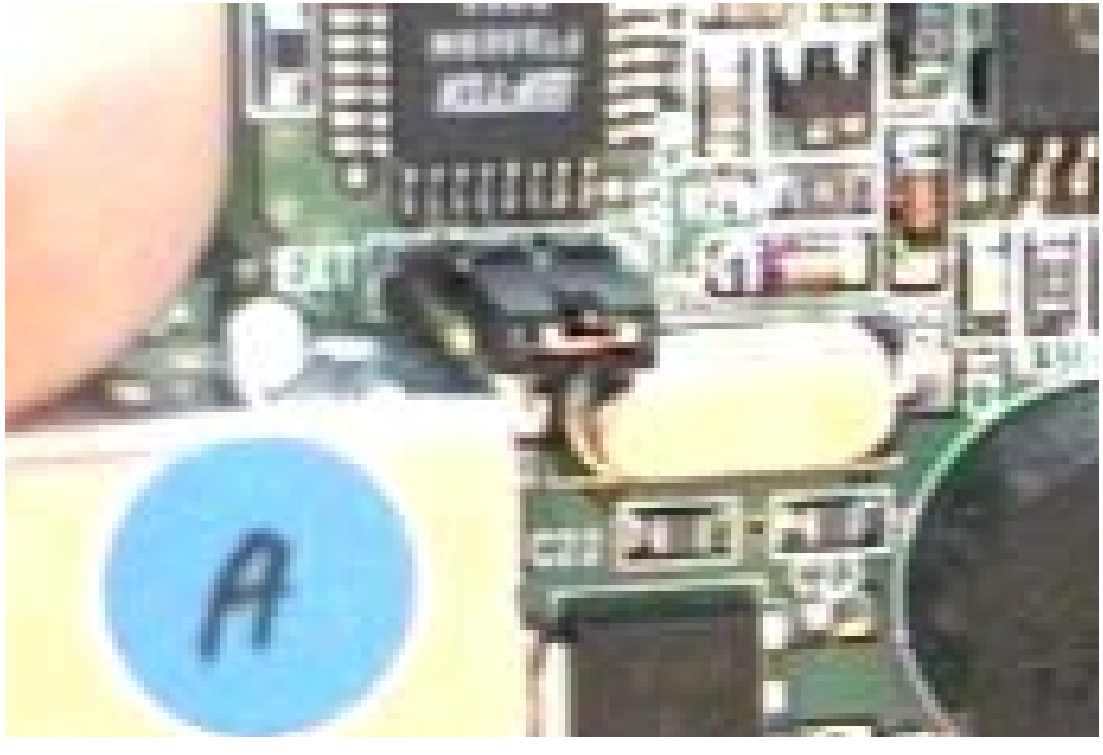
5.3. Preparing the Cradle to work with the external antenna

The Cradle is equipped with an internal jumper that connects the transmitter either to the built in wipe antenna or to the external magnet antenna.
To change the jumper position:

1. Unfasten the four screws at the back of the Cradle
2. Carefully rotate the Cradle
3. Remove the front cover
4. Place the jumper in the desired position


Antenna
jumper

The jumper connects the middle pin either to the right-hand pin marked INT (internal antenna) or to the left-hand pin marked EXT (external antenna)



5. Replace the front cover, turn the Cradle over and refasten the four screws at the back of the cradle

Chapter 6 External Sensors

MicroLog works with the following external sensors:

6.1. Temperature -50°C to 100°C

This MicroLog sensor takes external temperature measurements over a wider range than the internal temperature sensor with a faster response time than the internal sensor.

Specifications:

Range:	-50°C to 100°C
Resolution:	Better than 1°C between -20°C to 75°C
Accuracy:	±2% of reading
Probe Length:	150 mm

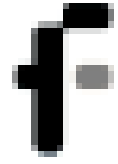
Probe OD	3.2 mm
Max. Temperature	150°C

6.2. Temperature -10°C to 10°C

This is a high-precision temperature sensor designed for refrigeration monitoring

Specifications:

Range:	-10°C to 10°C
Resolution:	0.2°C
Accuracy:	±0.2°C
Probe Length:	50 mm
Probe OD:	4 mm



Operating Temperature:
-10°C to 50°C

6.3. Temperature -100°C to 120°C PT100 adapter

This is a wide range temperature adapter designed to process PT100 output

Specifications:

Range: -100°C to 120°C

Resolution: 1°C

Accuracy: ±1°C

Adapter operating Temperature:
-10°C to 50°C

Screw terminals for PT100 connection

6.4. Voltage Sensor

This is a general sensor that will measure any device or transmitter that produces a linear analog output of 0-10V. The voltage can easily be converted to the correct measured units with the help of the MicroLab software.

Specifications:

Range:	0-10V
Resolution:	0.05V
Accuracy:	±3% before calibration
Input Impedance:	3MΩ
Calibration:	Two point calibration

OV protection: +30V

6.5. Current Sensor

This MicroLog external sensor can sample any device or transmitter producing a linear current of 0-20mA. The 0-20mA can be converted to the correct measured units using the MicroLab software's Calibration option.

Specifications:

Range: 0-20mA

Resolution: ±0.1mA

Accuracy: ±3 before calibration

Calibration: Two point calibration

OC protection: 55mA

6.6. pH Sensor

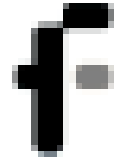
This external sensor monitors the pH level of liquids.

Specifications:

Range:	1-14pH
Resolution:	0.116pH
Accuracy:	5% of reading
Calibration:	Single point, done with a small trimmer on the sensor.

6.7. Contact Adapter

This MicroLog sensor monitors Reed Relay contacts and switch status (open/closed) to identify the correlation between phenomena such as temperature change and door status.



Specifications:

Range: open/close

Connector: Screw Terminal

Cable Length: 2.5m

Internal Pull-Up Resistor: No need for external power source

Specifications

MicroLog

Models:

EC600 temperature and external sensor data logger

EC650 temperature, relative humidity and external sensor data logger

Inputs:

Two built-in sensors:

Temperature: -30°C - 50°C (resolution 0.5°C, accuracy ±0.6°C)

Specifications

Relative Humidity: 0-100% (resolution 0.5%, accuracy ±3%)

External sensor:

Voltage	0 to 10V
Current	4 to 20mA
Temperature	-50°C to 100°C
pH	0 to 14pH
Contact	open / closed

Outputs:

Two digit 7-segment LCD

IRDA interface to HP-printer and host computer

RS232 serial communication at 19,200 bps

Memory Capacity:

16,000 recording samples

Power Supply:

Internal Lithium Battery - 3.6V 1.2AH 1/2AA

Battery Life - approximately two years, replaceable

(Lifespan may vary with use of external sensors)

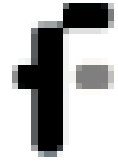
Sampling Rate:

User defined: from once every 10 seconds to every 2 hours

Dimensions:

Diameter - 72mm

Thickness - 22.9mm



Weight - 55gr

Standards

Water and dust proof IP65 standard, compliance for EC600 model

CE and FCC standard compliance

MicroLog Cradle

Audible alarm.

Serial communication channels:

RS232 at 19.2Kbps

USB at 1.5Mbps

Memory Capacity (DT175 only):

2,000 recording samples

Connectors:

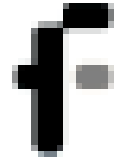
4-pin flat connection to the MicroLog

4-pin flat connection to any MicroLog external sensor

Screw terminal for External DC supply, Connection to external sensor, External control switch and additional Contact sensor (the additional contact sensor is available in DT175 only)

Power supply:

Internal: lithium battery, 3.6V



Battery Life - approximately 100,000 transmissions, replaceable

External: 6-30V, minimum 300mA

RF transmission (DT175 only):

EMC conformant to ETS 300-683

Type approved to ETS 300-220. Usable range to 300m (75m indoors) 418 (UK) & 433.92MHz (Euro) versions

1mW on 418 MHz, 10mW on 433.92MHz

2nd harmonic <-60dBc

16cm wipe antenna

CE and FCC standard compliance

MicroLog Plus Receiver

Usable range to 300m (75m indoors)

One RS232 communication port to the computer's

Power supply:

External AC/DC 6V adapter

Red LED indicating RF signal

Green LED indicating valid data being received

Type approved to ETS 300-220

CE and FCC standard compliance

Software

MicroLab software

- Downloads data from MicroLogs
- Graph and table displays
- Displays alarm levels on graph
- Setting up MicroLog:
  - Define sensors
  - The ID number of each of the cradles
  - The alarm levels of each data logger
  - Comment (name) for each data logger

Sampling rate: From once every 10 seconds to every 2 hours

Automatic daily download:

Wireless daily download from up to 200 MicroLogs

Automatic data saving

Daily status report

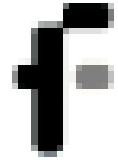
System requirements

Software

Windows 95 or later
Internet Explorer 4.0 or later (you can install Internet Explorer 5 when you install MicroLab, since it ships with the product)

Hardware

Pentium 300MHz or higher



32 MB RAM (64 MB recommended)
5MB available disk space for the MicroLab application

MicroLab Plus software

Wireless communication with up to 200 MicroLogs:

Real-time temperature and humidity and external sensor readings

Displays data in meters or on graphs

Visual and sound alarm when the data reading exceeds a minimum or maximum alarm threshold for temperature or humidity

E-mail alarm notification

Displays battery level

Automatic data saving to an Excel file

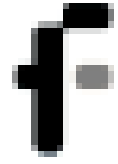
Setting up MicroLog:

- Define sensors
- Sensor calibration
- The ID number of each of the cradles
- The alarm levels and properties of each data logger
- Comment (name) for each data logger
- Sampling rate: From once every 10 seconds to every 2 hours.

System requirements

Software

Windows 95 or later



Internet Explorer 4.0 or later (you can install Internet Explorer 5 when you install MicroLab Plus, since it ships with the product)

Hardware

Pentium 300MHz or higher

32 MB RAM (64 MB recommended)

5MB available disk space for the MicroLog Plus application

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